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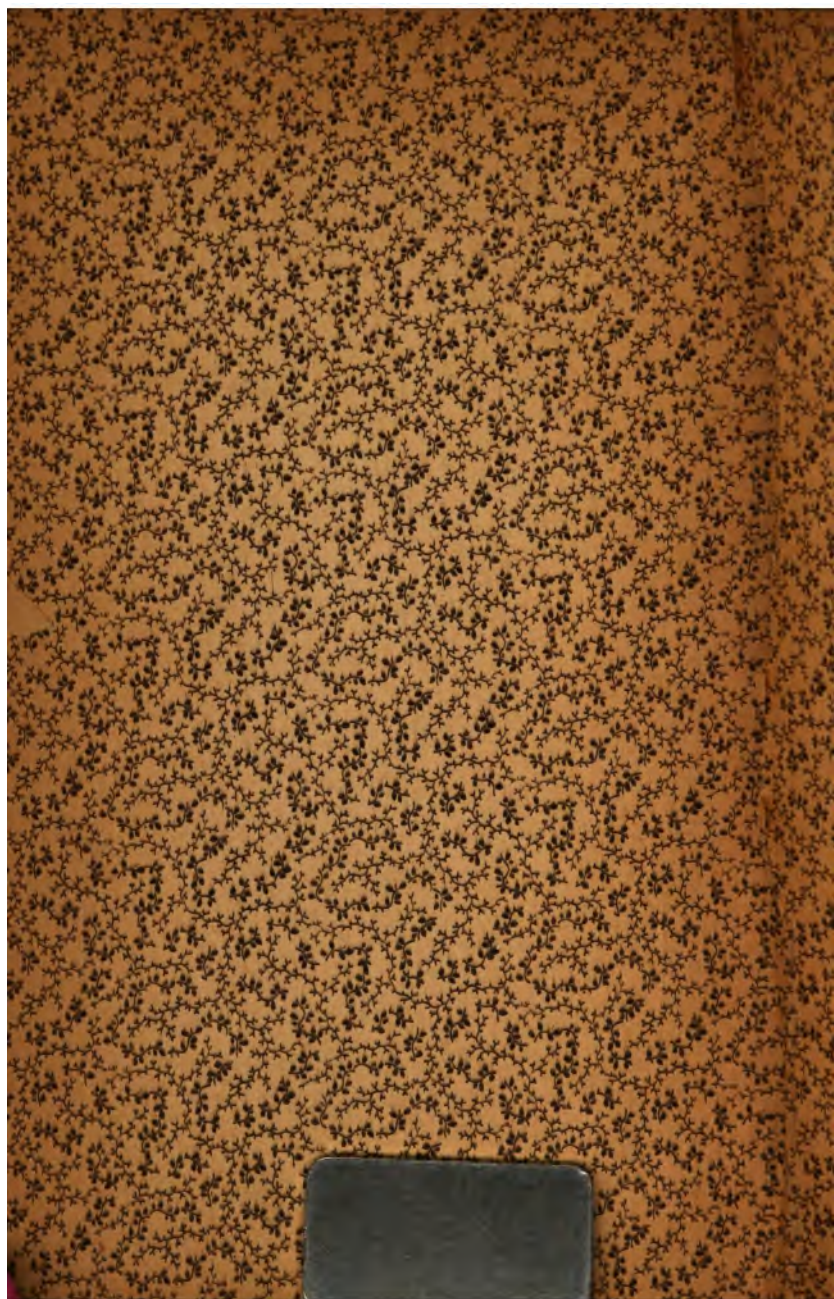
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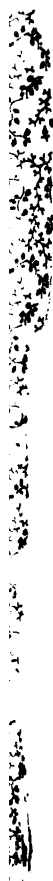
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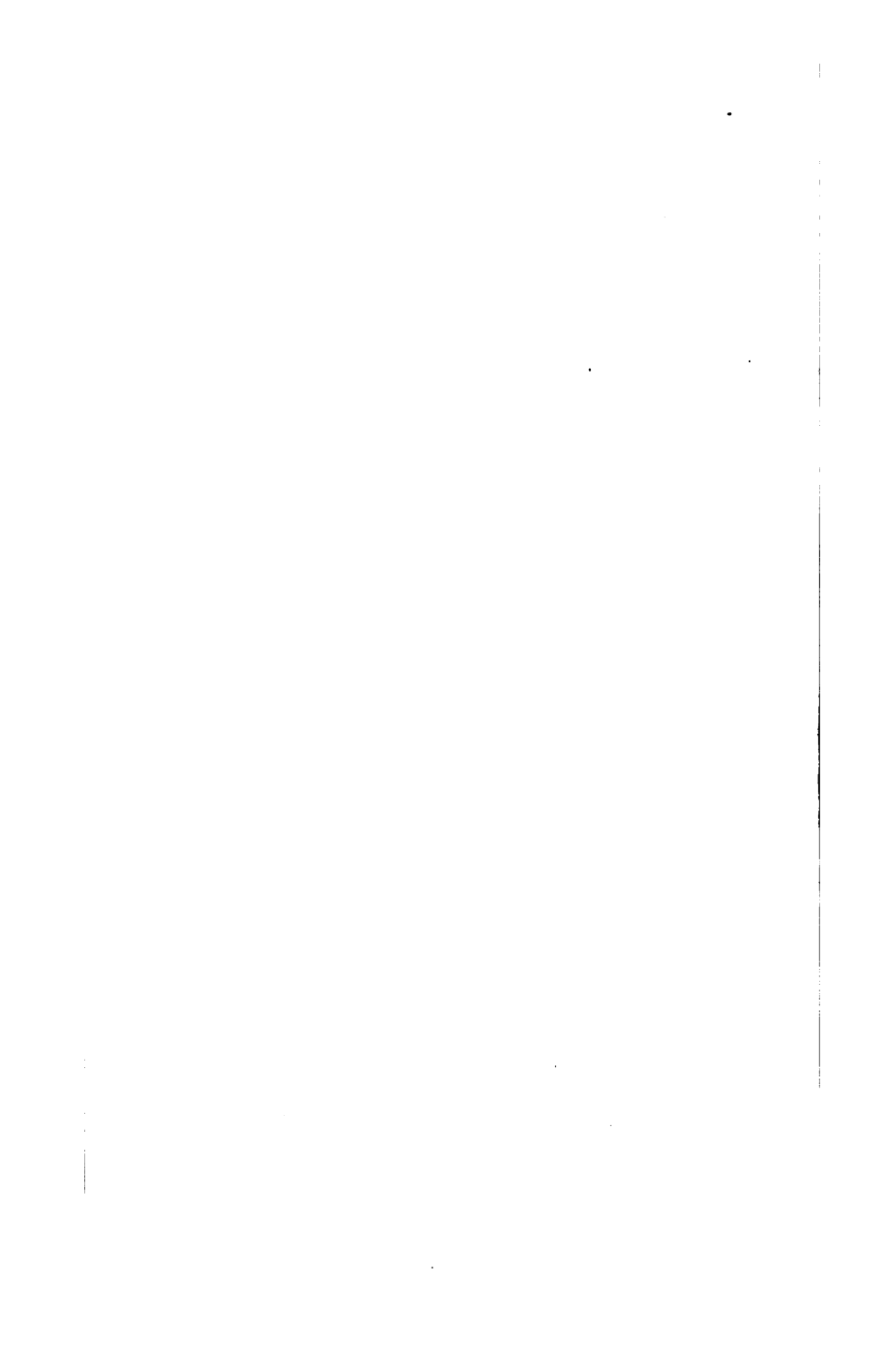




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THE OLEATES.

AN INVESTIGATION INTO THEIR NATURE AND ACTION.

BY

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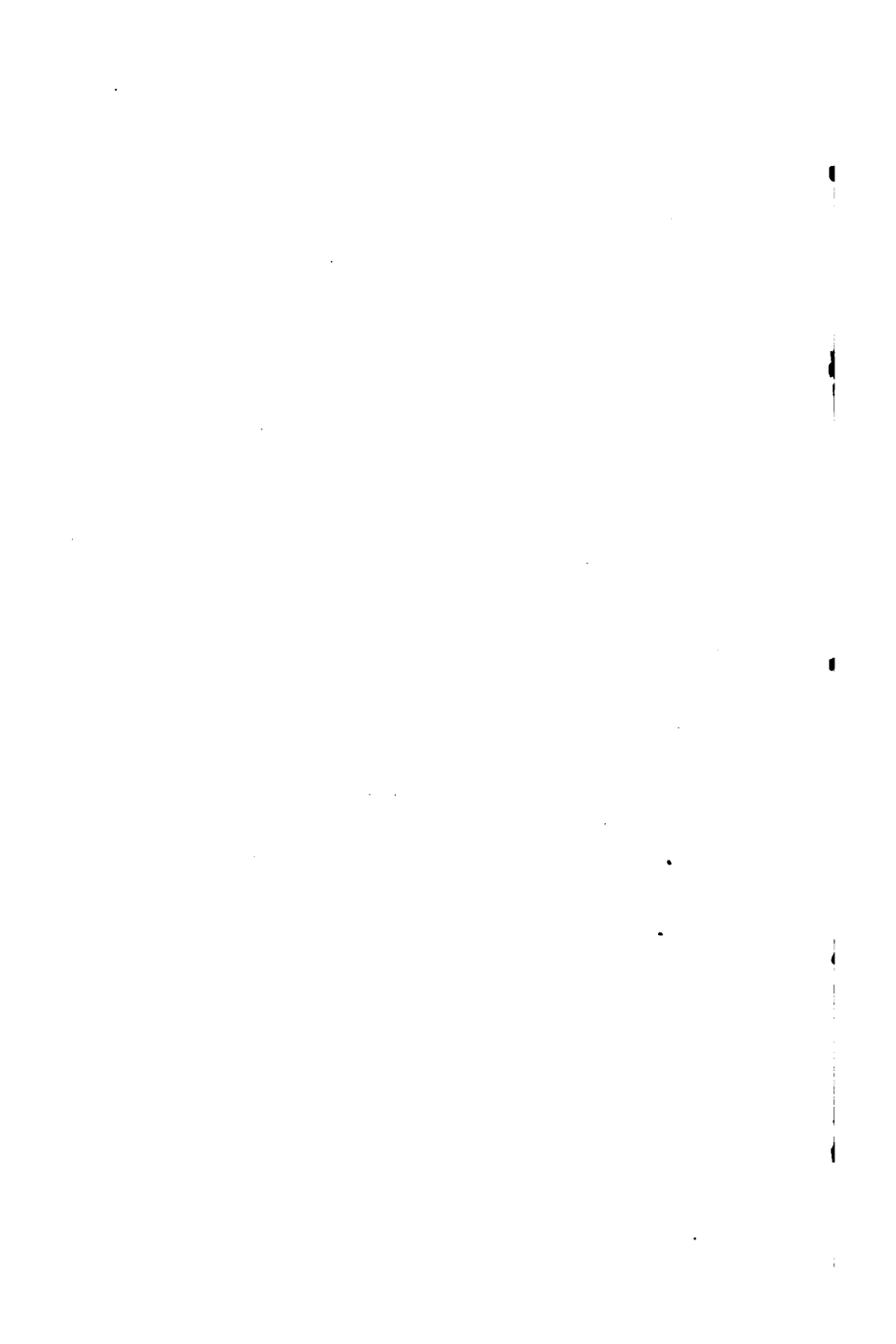
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TO THE MANY
Physicians and Students
WHO, FOR THE PAST TEN YEARS, HAVE ATTENDED MY CLINICS
AT THE
PHILADELPHIA HOSPITAL FOR SKIN DISEASES,
THIS LITTLE VOLUME IS RESPECTFULLY
DEDICATED
BY
THE AUTHOR.

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PREFACE.

A PERIOD of ten years has elapsed since I became interested in the production of the different oleates and their introduction to the medical profession as useful remedies for the treatment of diseases of the skin, etc. From that time I constantly endeavored by investigation and experiment to test their value, and it is pleasant to say that my efforts have proved successful, as evinced both in my hospital and private practice, and in the adoption of the oleates by practitioners in this country and in Europe. The results of my labors were publicly made known through papers read before the Philadelphia County Medical Society, the Medical Society of the State of Pennsylvania, the American Medical Association, the British Medical Association, and the International Medical Congress,

held at Copenhagen. This small volume is not only a *résumé* of all that I have heretofore written concerning the oleates and their uses, but enables me to lay before my readers in a permanent form all my latest experience. It also contains much new matter that I think will prove interesting and of value that I have not heretofore published.

It is with pleasure that I acknowledge the efficient aid and co-operation of my friend, Dr. L. Wolff, well known in connection with the chemistry of this subject, who, with untiring assiduity, rendered me every assistance in his power to further my efforts towards a satisfactory conclusion. Likewise to my friend, Mr. J. Lesley Anderson, who carefully examined and corrected the proof, my acknowledgment is due.

J. V. S.

PHILADELPHIA, 1031 Walnut Street,
April, 1885.

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THE OLEATES.

AN INVESTIGATION INTO THEIR NATURE AND ACTION.

I.

HISTORY AND ORIGIN.

THE use of fatty vehicles in applying medicinal substances to the cutaneous covering of the body, for the purpose of producing either a local effect or with a view of making a constitutional impression, is probably as old as medicine itself, and there is scarcely a doubt that inunctions performed a most important part in the early history of medicine. The fatty bodies then used were oils expressed from the seeds and fruits of plants, as well as fats of both domestic and wild

animals, and to each class different actions were assigned. It is not beyond the recollection of the older members of the profession, when dog fat, snake and bear oils, though not dissimilar in nature, or only slightly so, had varied and often absurd therapeutic actions attributed to them.

When, in many other ways and instances, chemistry came to enlighten science, it showed that fats and oils had, generally, a similar constitution, depending on the presence of basic and acid radicals—the latter being present in various forms, while the former, as a prophenyl or glyceryl, was generally found as a constant component.

When Chevreul, in 1811, proclaimed the chemistry of fats and oils, and isolated fatty acids from their bases, the first step in the direction of a more

thorough understanding of their nature and action had been taken. Quickly following this discovery it was proved that fatty acids, especially the oleic acid, could be united to other bases as well as to the original one.

This is undoubtedly the first comprehensive knowledge we had of a class of remedial substances which forms the subject of this treatise, and which are known as oleates. While as such they had been in use for centuries previous to this period, they were applied empirically without a knowledge of their constituents. Thus we had lead-plaster, soaps, etc., but they were only known as such, and not as salts or combinations of a fatty acid with metallic or alkaline bases, which stamped them respectively as lead oleopalmitates and sodium or potassium oleopalmitates or stearites.

Their medicinal application, in various ways, by using oleic acid as a solvent for alkaloidal substances, was subsequently agitated by Professor Attfield, in 1862; and a paper on their use in medicine, by Dr. John Marshall, ten years later, brought them prominently before the medical profession. Dr. Marshall's valuable communication and its suggestions soon attracted attention, and efforts were made to further perfect both the acid and its products. It was about this time that Dr. L. Wolff, a well-known chemist of Philadelphia, was experimenting on oleic acid and its derivatives, and interested me in his investigations, which we afterwards pursued together.

The oleic acid of the market of that period was an unsightly, dark, and rancid body, of very offensive odor,

known to the trade as the red oil of the candle-maker—the refuse, after the separation of most of the stearic acid, which is utilized for illuminating purposes. It represented a combination of oxyoleic and stearic acids, along with numerous volatile fatty products, and if it were, either alone or otherwise, applied to the skin, it proved an irritant rather than a mild vehicle and carrier of medicinal substances.

Purification of this acid availed very little, and to this day its use, though advocated by mercenary manufacturers, is often accompanied, as I shall point out hereafter, with frequently unpleasant and injurious results.

As the oleates, as then known, were at best only oleic solutions, or solutions of some oleate in a large excess of oleic acid, the disappointments they

caused in their action seriously interfered with their successful introduction and use by the profession. While oleic acid sufficiently pure to overcome these objections could be had, and was so produced by Dr. Wolff, the price, in consequence upon the manner of its production, was such that it precluded its extensive use in hospital or general practice. It now became our principal object to make an acid sufficiently pure and at a reasonable cost. This object was accomplished by using oil of sweet almonds—which contains a large amount of olein—and saponifying it with litharge, in the same manner as is employed in the process of making ordinary lead-plaster, and dissolving the mixture in petroleum benzine at a low boiling point, which left the lead palmitate undissolved; the clear solution of lead oleate, decanted

from its palmitate, was then put into an agitator, and thoroughly shaken with dilute hydrochloric acid (one in eight), and on settling, when it gave no longer evidence of the presence of lead on the introduction of a stream of hydrogen sulphide, the benzine was distilled off from it, in the presence of water, to obviate the possibility of the oxidation of the acid. The acid was now deprived of the odor of the heavier coal-oil products by introducing a stream of aqueous steam, and was kept under a surface covering of water all the time to prevent oxidation. It was subsequently separated from the water, and filtered in an apparatus admitting of no access of atmospheric air.

The oleic acid so obtained contains no palmitic acid (or almost none), is of very light color, has a specific gravity

erties, representing those of the oxide, it failed to show them very long, as, by its chemical nature, the acid oxidized at the expense of the oxide very quickly, reducing and precipitating the latter both as a mercurous oxide and metallic mercury. This is unavoidable, as oleic acid is a readily oxidizable body, the replaceable hydrogen of which, when not fully saturated, is bound to produce like results with oxides of diads.

The oleates of the alkaloids prepared in this way contain large excesses of acid, and represent according to their chemical character a more stable class of remedies. As many of the alkaloids, however, are not entirely freed from their acid radicals, and the latter are not displaced by the weaker oleic acid, their production is not always easily accomplished, and the

desire of the manufacturer to produce clear oleates creates the danger of removing by filtration some or even a greater part of the alkaloid which they contain; or even if fully dissolved by heat or other solvents, they are very apt to recrystallize or separate on standing from their solutions. These oleates of the alkaloids, as they are termed, are little else than acid solutions, or, as implied by their name, they were considered so by stating the percentage of the alkaloid held in solution by the oleic acid. Thus, while 25 per cent. quinine oleate contained 45.3 per cent. of the oleate, it also contained 54.7 per cent. of free oleic acid; 2 per cent. aconitine oleate—3 per cent. of oleate, 97 per cent. free acid; 2 per cent. atropine oleate—3.94 per cent. oleate, and 96.06 per cent. acid; 5 per cent. morphine oleate—6.5 per

cent. oleate, and 93.5 per cent. of the acid; 2 per cent. veratrine oleate—2.94 per cent. oleate and 97.06 per cent. acid; 2 per cent. strychnine oleate—3.68 per cent. oleate and 96.32 per cent. of acid. It will thus be readily seen that there is a vast difference between oleic solutions of alkaloids and the oleates thereof. While in other salts we lose sight of the acid radical or the base, which we consider to have lost their identity in the chemical reaction of their constituents, we have most unscientifically upheld a series of preparations which, while we have termed them chemically, we have treated as mechanical mixtures altogether. To use the argument that the alkaloidal substances alone were to give force to such preparations, is to set up a theory which would upset our present knowledge that two bodies

on entering a true chemical combination lose their identity in forming a third at variance with its components. Even the oleates of the alkaloids, if they are to be used in medicine, must be considered as oleates only and lost sight of as a mixture of alkaloid and acid.

Impressed with the many defects, disadvantages, and the instability of the oleates as then made, we worked toward the end of getting oleates that would be what their name implied, remain stable, and could be relied on for their action. To accomplish this, it was first of all necessary to have an oleic acid both in name and nature, and next to combine it fully, *i. e.*, saturate it with the base to be used, and thus enable us to produce neutral and chemical oleates having neither base nor acid in excess.

This was effected, as described in a brief and incomplete manner in my paper presented to the Pennsylvania Medical Society in 1882, by first using the above described oleic acid in making a sodium oleate as the source for all the other oleates, and the manufacture of which I shall now proceed to describe.

II.

PROCESS OF MANUFACTURE.

SODIUM OLEATE.

Na. $C_{18}H_{33}O_2$. M. W. 304.

SODIUM oleate is perhaps one of the oldest if not the oldest oleate known; it does not occur in a pure state in commerce, the substance representing it being known as the soap of the market. That the sodium is combined with not only oleic acid, but also palmitic, stearic, and other acids, making it an oleopalmitate or oleostearate or both, is well known; also, that in the process of saponification a great deal of the oleic acid is changed into oxy-oleic acid. To make a pure and true sodium oleate therefore is easily effected by saponifying oleic acid, as I

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have stated, with a solution of sodium hydrate or potassium hydrate, on the saturation of which water is added and heat applied until a clear solution of the sodium oleate is obtained. This, if it were neutral, might at once be utilized to make the oleates; but as this cannot practically be accomplished, and an excess of alkali would reduce the salts used for their precipitation, or an excess of oleic acid would again cause an excess of acid, which was found of such disadvantage in the earlier oleates, it is therefore necessary to have in the process of making the sodium oleate the alkali slightly in excess, and then by the salting out process of the soapmaker to separate the oleate from its solution. This accomplished, it is strained from the liquid, well expressed, and then allowed to dry. As yet, however, it con-

tains salt and water and other admixtures which are best removed by dissolving the mass in stronger alcohol, filtering it, and recovering the alcohol in it by distillation. The pure sodium oleate so derived presents a diaphanous almost colorless body, readily soluble in warm and only slowly soluble in cold water. A solution of this in eight parts of water is what I shall term hereafter the sodium oleate solution, by means of which all oleates are to be made.

The manufacture of oleates from the sodium oleate solution is very simple and easily accomplished. A neutral solution of a salt of the substance to be derived as an oleate, is added to the sodium oleate solution until the latter is completely decomposed, a degree to be ascertained with a little experience in the manipulation, and most readily

detected when on rapid stirring no froth appears on the surface or bubbles cease to form. As some of the salts, however, on addition of water, not alone decompose but fail to yield oleates, and their purification besides is a matter of difficulty, I will treat the process employed for each separately, giving, however, first a synopsis of the general plan to be adopted for making oleates of the alkaloids.

OLEATES OF THE ALKALOIDS.

As many of the salts of the alkaloids are not readily soluble in water, their solution is accomplished by the addition of a slight excess of their acids, which, upon being filtered, are added to a warm solution of sodium oleate. The amount of the salts so used is to be noted, and the corresponding amount of their alkaloids com-

puted from their molecular weights, along with the necessary amount of oleic acid necessary for complete saturation. The separated oleate, deprived of its water, is then weighed and the result in excess of the computed oleate is set down as free oleic acid. As the oleates of these preparations are at present principally used as acid solutions (a method which I do not recommend, however), sufficient oleic acid is added to bring it up to the requisite percentage, the true alkaloidal oleate serving as a base.

ALUMINIUM OLEATE.

$\text{Al}_2 (\text{C}_{18} \text{H}_{33} \text{O}_2)_3$. M. W. 397.

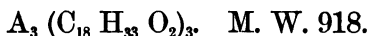
This is a substance of a yellowish color of the consistence of a soft plaster mass, but elastic to the touch, resembling hardened gelatine both in consistence and appearance. It is often

manufactured of a white color and streaked with yellow and brown, or spotted with foreign ingredients. This is due to the fact that it has not been purified or deprived of the water it holds inclosed in the spongy mass as first precipitated. If pure and true it should readily and without turbidity dissolve in ether, chloroform, or petroleum benzine, should make a clear solution with fats or oils when melted with them over a water-bath, and should be very tenacious. It is best prepared by precipitating the sodium oleate solution with a solution of aluminium sulphate; the white spongy precipitate should be first expressed, then freed from the adhering water at a temperature not exceeding 100° C., after which it is dissolved in good and very volatile petroleum benzine; the benzine solution is then filtered and

the benzine allowed to evaporate or distilled off. The aluminium oleate thus derived, well heated over a water-bath to rid it of any adhering petroleum odor, is then ready, and presents the condition and appearance as I have noted.

Aluminium oleate, according to its molecular weight, contains about 3.1 per cent. metallic aluminium, equivalent to about 17.9 per cent. aluminium hydrate.

ARSENICUM OLEATE.



This oleate, if properly prepared and well made, is of a reddish-brown color of a solid somewhat waxlike consistence, breaks on bending, and melts at about 85° C. As generally offered in the market, and by some very respectable manufacturers too, it is not an

oleate but simply a mixture of oleic acid, chloride of sodium, and arsenious acid (to the latter of which its apparent effect has been due), and is readily miscible with alcohol, yielding therewith a clear solution. If a portion of this be treated with ether, or, still better, petroleum benzine, and this, by filtration or separation, is separated from the underlying aqueous layer, and into it a current of hydrogen sulphide be led, no precipitate occurs, showing the total absence of arsenicum oleate. The arsenicum oleate (and so far the only one which I have been able to get is from Dr. L. Wolff), besides possessing the characteristics and appearance as above stated, should be insoluble in alcohol but readily and entirely soluble in petroleum benzine, and when a current of hydrogen sulphide is introduced into the latter

solution after filtration it gives a copious yellow precipitate of arsenicum sulphide.

In my last paper on the "Oleates and Oleopalmitates in Skin Diseases," already referred to, I simply gave in brief a few hints as to how arsenicum oleate may be obtained, with no attempt at accuracy or detail, and I am therefore not surprised at the failure of many manufacturers with it, in view of the fact that the arsenicum chloride is at once decomposed into arsenious acid and hydrochloric acid on the addition of water. If the arsenicum chloride simply be added to the sodium oleate solution, the result will be invariably a pseudo oleate, as already pointed out, and I therefore give the method employed by Dr. Wolff, which he describes as follows: "A solution of arsenicum chloride is

made in the usual way and then diluted with about four times its bulk of glycerine. Instead of the sodium oleate solution, I use the alcoholic solution before the alcohol is distilled from it. This alcoholic sodium oleate solution is mixed with the glycerine solution of arsenicum chloride until the former is fully decomposed. After the precipitate is strained off, washed well with alcohol to get rid of any adhering glycerine, the washed precipitate dissolved in benzine, and the benzine fully evaporated, the residue will present a chemically true and pure arsenicum oleate. According to computation it contains about 8.16 per cent. of metallic arsenic, representing about 21.5 per cent. of arsenious acid."

BISMUTH OLEATE.

$\text{Bi} (\text{C}_{18} \text{H}_{33} \text{O}_2)_3$. M. W. 1053.

This is a soft unguent body of pearly-gray color, and should be termed, chemically, a bismuthous oleate, as bismuthyl does not enter into combination with oleic acid, a fact which is overlooked by many in endeavoring to make a direct union of bismuth oxide with that acid. Ointments, so named, hold simply the oxide in suspension, but contain none of it in solution or chemical combination. It should be when properly prepared semi-diaphanous, and on being rubbed on the skin should present no evidence of any solid particles suspended therein, *i. e.*, it should leave no white mark on the skin or its crevices. It parts very reluctantly with the water it holds in suspension, and many of

the articles of this name in the market have a watery sponge-like appearance. When first precipitated it is very white, and on manipulation a great deal of water may be liberated; while in this state it does not readily mix or dissolve in benzine, but on driving off all the water by evaporation it fully dissolves, yielding an almost clear solution. Its preparation is not quite as easy as some of the others, as it requires first of all the formation of bismuthous nitrate in crystals. This is accomplished by treating purified metallic bismuth with nitric acid, evaporation, and subsequent crystallization. The crystals thus derived are first drained off, dried between bibulous paper, and then dissolved in glycerine. This glycerole of bismuthous nitrate is then decomposed with the solution of sodium oleate, yielding

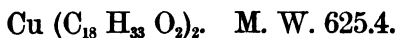
a bulky, white precipitate as before remarked. Bismuthous nitrate cannot be dissolved in water, as it yields then the bismuthyl nitrate. Any bismuth oleate made in that way is little more than a suspension of bismuthyl nitrate (bismuth subnitrate) in oleic acid. The precipitate should be well washed with copious repetitions of hot water until no traces of sodium nitrate are detected in the washing. It is then transferred to a water bath and evaporated until samples taken from it dissolve in benzine without turbidity. The true and pure bismuth oleate contains about 19.9 per cent. metallic bismuth in combination with oleic acid, that amount of bismuth representing about 44.3 per cent. bismuth oxide.

CADMIUM OLEATE.

$\text{Ca} (\text{C}_{18} \text{H}_{33} \text{O}_2)_2$. M. W. 673.8.

It is of a waxy consistence, yellowish-white, and dissolves readily in benzine. If dissolved in petroleum fats it gives a solution of great brilliancy, which, on cooling, assumes a semi-diaphanous appearance. It is readily made by precipitating the sodium oleate solution with an aqueous solution of cadmium sulphate. The precipitate should be well washed out with warm water until the washings fail to show any sulphate if tested with barium chloride solution. It is then dried well over the water bath or between bibulous paper. It contains about 16.5 per cent. of metallic cadmium.

COPPER OLEATE.



This is a beautiful green waxy substance of the cupric group, resembling on drying slight efflorescence of cupric salts. It dissolves readily and without turbidity in benzine, ether, and chloroform; oil of turpentine imparting to these solutions its beautiful dark green color. On account of its easy method of manufacture it is generally obtained in a good and pure condition, provided that the oleic acid used in the process of making sodium oleate is pure and devoid of oxyoleic and other irritant impurities. It is readily made by precipitating the sodium oleate solution with a solution of cupric sulphate, the precipitate well washed with hot water, until freed from the sodium sulphate formed in

the decomposition, then dried between bibulous paper, and subsequently air-dried. So made it contains about 10.1 per cent. of copper.

IRON OLEATE.

$\text{Fe} (\text{C}_{18} \text{H}_{33} \text{O}_2)_2$. M. W. 617.9.

This is a dark-brown-reddish plaster-like substance of a distinct ferruginous odor. As generally found it meets all indications, excepting that impure oleic acid still further renders its odor more disagreeable. It is prepared by precipitating the sodium oleate solution with a solution of ferrous sulphate. When first precipitated it is of a greenish-white color, which upon boiling and exposure to the atmosphere changes to a reddish and subsequently to a dark-brown-reddish color. It should be well washed in the usual way to remove the sodium sulphate of

the decomposition process as well as the ferrous sulphate used in excess in the precipitation. It contains about 9.4 per cent. of metallic iron.

LEAD OLEATE.

$\text{Pb}(\text{C}_{18}\text{H}_{33}\text{O}_2)_2$. M. W. 669.

This is one of the oldest known oleates, antedating as such even the knowledge of oleic acid and its compounds. It represents as such a purer state of the lead-plaster of the Pharmacopœias. It is of a yellowish-white color, of plaster consistence, though harder than the ordinary lead-plaster, and devoid of the slippery feeling conveyed to the latter owing to the presence of glycerine. It should be readily soluble in benzine with slight turbidity, and after filtration of the solution and evaporation of the latter leaves a semi-diaphanous

plaster body, which on exposure to the air assumes at first a yellowish color giving way to a pure white. It is readily and easily prepared by precipitating the sodium oleate solution with a solution of the neutral lead acetate. In its precipitation there is always some lead hydrate and carbonate formed, which, however, as a contamination, is not objectionable. After precipitating it should be well washed with warm water until the washings come off pure, and if desired to obtain it absolutely pure it should be dissolved in benzine after being thoroughly pressed out and dried. The benzine should then be allowed to evaporate. It contains about 26.7 per cent. of metallic lead.

MERCURIC OLEATE.

 $\text{Hg} (\text{C}_{18}\text{H}_{33}\text{O}_2)_2$. M. W. 762.

This oleate is by far the most important one which up to the present time has been the most extensively used. It is of a yellow color, of a somewhat tenacious ointment consistence, and of the general odor of all oleates. As usually found in the market it has a greenish-gray color, owing to the fact that its mercuric component is reduced to a mercurous oxide and metallic mercury, and has an excess of oleic acid favoring the reduction process. If pure and properly made it will show no sign of this excess; it should be insoluble in alcohol, but readily soluble without turbidity in benzine. Mixed with several times its weight of stronger alcohol, and the oleate allowed to deposit in this solu-

tion, will give the amount of mercuric oleate in the latter after all the alcohol is evaporated, while the evaporated alcoholic washings will give the amount of free oleic acid. A bright strip of copper immersed in the oleate will speedily be covered with a film of metallic mercury.

It has been the custom to use as mercuric oleates oleic solutions thereof, to the detriment of the preparation, as, by its oxidizing tendency, the oleic acid soon disoxidizes the mercuric oxide entering into its composition and deposits it in such solutions as mercurous oxide, as well as globular metallic mercury. That such solutions when used fail to give satisfaction in results is, therefore, not to be wondered at, and I feel satisfied that none of the so-called oleates, or rather oleic solutions, contain, after standing

for some time, any appreciable or serviceable amount of mercuric oleate. The utmost care has been exercised by chemists to overcome this, both by using purer acids as well as a nicety of manipulation, but to no purpose, as the fault lies in the excess of the acid, which will never admit the keeping of such an unobjectionable preparation. The process of making mercuric oleate may be conducted in two ways. The direct one is to unite the pure acid directly with the mercuric oxide in its chemical proportions, *i. e.*, 71.65 parts of oleic acid with 28.35 parts of mercuric oxide; but this process is subject to the excess of either one or the other, which, however, can be remedied by washing with stronger alcohol to remove any excess of acid. To remove any undecomposed particles of mercuric oxide which would become detri-

mental as local irritants, dissolve the oleate so derived in benzine, filter the benzine solution and allow the benzine to evaporate. Care must be had in the direct process to conduct it entirely under water and only with a moderate heat, else the process of reduction will commence before the entire reaction has taken place.

The second, and by far the most simple and rapid one of the two, as well as that admitting of a better product, is by the double decomposition of sodium oleate and mercuric nitrate. The mercuric nitrate for that purpose is made by the action of strong nitric acid on mercuric oxide in sufficient quantities to entirely dissolve the latter, taking care to use as little acid in excess as possible. The solution so obtained is diluted with some water, an excess

being avoided, and is then decomposed by additions to it of solutions of sodium oleate until the latter is in excess, which will be the case when the characteristic froth of soap is observed on the surface. The heavy precipitate, so formed, is next drained off, and washed with warm water to remove all traces of soap and potassium nitrate, and when this is accomplished and free from water, it is mixed with alcohol, which dissolves the free oleic acid from the oleate, caused by the excess of nitric acid in the mercuric nitrate solution, and after this is decanted, the alcohol is evaporated from the oleate. The washings containing oleic acid can be distilled and the alcohol recovered for use in similar subsequent proceedings. The mercuric oleate so prepared is a pure and true oleate, permanent under

all ordinary atmospheric conditions, and can be relied on for its action. If to be diluted, it is best done with a neutral fatty body, which will not cause its decomposition. A neutral mercuric oleate thus prepared contains about 26.2 per cent. of metallic mercury, equivalent to about 28.35 per cent. of mercuric oxide.

MERCUROUS OLEATE.

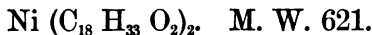
$\text{Hg}_2 (\text{C}_{18} \text{H}_{33} \text{O}_2)_2$. M. W. 962.

This is an oleate not generally known or used, and only recently brought out by me. It is a whitish-gray granular sticky substance, which is very prone to decompose, forming • mercuric oleate and mercurous oxide, also globular mercury. It is at once so decomposed if boiled or treated with hot water, and should be washed out cold only to free it from the ad-

hering sodium nitrate, and then freed from adhering water between bibulous paper. It is quite distinct, both in appearance as well as in effect, from the mercuric oleate, and on account of its ready decomposition and the liberation of free mercury it is apt to produce the same effect as the mercurial ointment of the Pharmacopœia. It makes a turbid solution with benzine and dissolves readily and clear in warm fats and in the petroleum ointments. It is prepared from crystallized mercurous nitrate, which in turn is prepared by treating metallic mercury in excess with nitric acid, evaporating the solutions crystallizing the same, and drying the drained crystals between bibulous paper. This aqueous solution, decomposed with sodium oleate, gives at first a whitish precipitate, which if washed with hot

and boiling water yields a grayish-blue ointment representing mercurial plaster both in appearance and physical properties. In that form it represents a mercuric-mercurous oleate, and combines both the sorbefacient effect of the mercuric oleate with the constitutional impression of the mercurial ointment. Its advantage is that it contains double the amount of mercury than the preceding mercuric oleate, which amounts to about 41.5 per cent. of the metal.

NICKEL OLEATE.



This is another new oleate recently brought out and investigated by me. It is of a beautiful blended light-green color, a glossy, waxy appearance, and plaster consistence. It mixes readily with fats and oils and dissolves in

benzine. It is made by decomposing sodium oleate solution with a solution of nickel sulphate, washing the precipitate with warm water and expressing and drying it at an ordinary temperature. It contains about 9.5 per cent. metallic nickel.

SILVER OLEATE.

Ag. $C_{18}H_{33}O_2$. M. W. 389.

The silver oleate is a grayish-brown pulverulent body of an odor resembling oleic acid. It differs from the other oleates in the respect that it is not by itself soluble in either benzine or neutral fats, but needs an excess of oleic acid to render it so. That it is an oleate, which might be doubted from what is said above, can readily be substantiated by burning it on platinum foil, when it will give off profuse vapors, of an acrid odor, of a fatty,

empyreumatic nature, while a small quantity of silver oxide will be left behind. It is easily prepared by precipitating a solution of the silver nitrate with the solution of sodium oleate, washing the precipitate with warm, distilled water, excluding light while conducting the process, to prevent darkening of the precipitate, and also expressing and drying it with exclusion of light. It, however, soon changes color, getting darker, and therefore should be preserved in either blue, or, better still, amber-colored bottles. It contains about 27.6 per cent. of metallic silver, equivalent to about 59.3 per cent. of silver oxide.

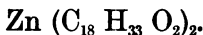
TIN OLEATE.

$\text{Sn} (\text{C}_{18} \text{H}_{33} \text{O}_2)_2$. M. W. 680.

This is a new oleate, that I had occasion to introduce. It is an un-

guent body of soft consistence, and brownish-gray color, has a characteristic metallic odor, and a very fine, greasy touch. It readily dissolves in benzine, and makes a clear solution when mixed with warm fatty substances or petroleum products. It is prepared by decomposing a solution of tin chloride with sodium oleate solution; as, however, a certain amount of tin oxide is separated in this process, it should, after separating it from the liquids of decomposition and washing, be dissolved in benzine; the solution, after filtration, leaves, on the evaporation of the benzine, the tin oleate. It contains about 17.3 per cent. of metallic tin.

ZINC OLEATE.



Specific gravity 1.0663. M. W. 629.9.

This, one of the most important of

this series of preparations, is, in its most useful form, an impalpable white powder, of a fine, soapy touch, somewhat oily odor, and if heated it melts into a homogeneous yellow liquid, which, on cooling, hardens into a mass presenting a crystalline fracture, with a specific gravity as stated. In powder form, while not entirely soluble in benzine, it readily dissolves, if warmed over the water-bath, with fat oils or petroleum fats, which is requisite to test its purity, for if zinc oxide is present warmed fats will not affect it. If burnt on platinum foil it should burn off to a large extent, leaving but a small white residue, soluble in concentrated mineral acids. Its complete solubility in warmed fats, absence of a disagreeable smoky odor, and combustion, are the surest tests of its purity. While

it is easily prepared, it requires some skill to obtain it as an impalpable, perfectly white powder. This is accomplished by using a dilute solution of zinc sulphate and decomposing it while cold with the sodium oleate solution. It is of importance that the solutions should be cold, and the zinc solution perfectly neutral, else an oleate will result that is coarse, granular, and soft, unfit for any other use than making ointments. The more dilute the zinc sulphate solution, the finer and whiter the oleate will be. After thoroughly washing it with cold water it should be expressed, and the cake air-dried and ultimately powdered, which is easily accomplished. It contains about 10.4 per cent. of metallic zinc, in combination with oleic acid, which is equal to about 12.9 of zinc oxide.

III.

PHYSIOLOGICAL ACTION OF THE OLEATES.

WITH a view of determining whether the oleates were absorbed into the blood when applied to the skin and thus produce systemic effects, the following experiments were made by Dr. L. Wolff and myself at the well-equipped physiological laboratory of the Jefferson Medical College, aided by Dr. Brubaker, the Demonstrator of Physiology of that institution.

In all instances the observations were made upon rabbits, and were conducted in the same way, viz: after being properly secured on a Czermak holder, the hair was carefully removed from the abdomen, so as to present as clean a surface as possible for the ac-

(46)

tion of the drug. The animals were then placed in a large glass jar, so that the excretion might be collected and examined chemically, to determine whether the drug had been absorbed. The first oleate experimented with was the—

QUININE OLEATE (25 per cent.). One ounce was thoroughly rubbed over the abdomen for a period of five minutes. At the end of twenty-four hours the urine was carefully examined, but no trace of quinine could be detected. In all other respects the animal was in a normal condition.

In the second rabbit two drachms of the same oleate were injected into the abdominal cavity. At the end of six hours no apparent effect had been produced, but in eighteen hours it was dead. Post-mortem examination showed evidences of irritation and

congestion of the peritoneal membrane, while the coagulated oil was found over the viscera and in the peritoneal cavity. In this case no quinine was discernible in the urine.

THE MERCURIC OLEATE was next experimented with in the same way. Two drachms were applied over the skin of the abdomen. At the end of twenty-four hours the feces had lost their hard character, and had become soft and of a yellowish-brown color. The feces and urine were both examined, but no mercury could be obtained. (The change in the consistency of the feces might have been due to the rubbing of the abdomen.) The animal exhibited no other evidences of the action of mercury.

THE COPPER OLEATE was next applied. Two drachms, softened with oleic acid, were rubbed upon the ab-

domen thoroughly. The rabbit remained in an apparently normal condition; at the end of twenty-four hours the urine did not contain a trace of copper.

THE ZINC OLEATE (one-half ounce) was applied in an exactly similar manner. At the end of twenty-four hours the subject was decidedly stupid, and almost helpless as regards motion. Upon killing it with ether and then opening the abdomen, a thick layer of gelatinous material was found just beneath the skin. The bloodvessels of the skin were enlarged. The irritability of the nerves and muscles remained normal, as was shown by stimulation with electricity. The urine, which was drawn from the bladder, contained no zinc.

THE STRYCHNINE OLEATE (two drachms, containing two and a half

grains of strychnia) was rubbed along the groin and inner surface of the thigh for five minutes, no effect had been observed during forty-eight hours after thoroughly applying the oleate to the abdominal walls.

THE ACONITINE OLEATE was applied in a similar manner. Two drachms, containing two and a half grains of aconitine, were rubbed along the groin and inner surface of the thigh for five minutes. At the end of twenty-four hours no effect had been observed. The animal was in a normal condition.

It thus appears from the foregoing experiments that the supposition the oleates were directly absorbed and taken up by the lymphatics and conveyed into the blood is entirely erroneous; on the contrary they prove that the oleates at no time can penetrate deeper than the epidermis and its con-

tinuation into the glands and follicles. Herein consists, in fact, the advantage that oleates have over ordinary ointments: that they can enter into the minute openings of the glands and follicles, on account of being dissolved in the fatty base and vehicle; whereas, in the ordinary ointments, no matter how minutely subdivided, the medicating agents would be prevented from acting in this way, the fatty vehicle alone being filtered off and entering. All the suppositions and hypotheses, setting forth how the oleates were absorbed and enter into the blood at once, are fallacious, and have not been confirmed by practical results, the most powerful of them scarcely showing any of their physiological effects. By what physiological process or manner the advocates of such theories would demonstrate their

assertions is to me unaccountable; thus, when a prominent writer claims that on brushing oleic acid or oleates lightly over the epidermic surface it disappears with an astonishing rapidity, equalling that of some evaporant, I can only account for it by supposing he is endowed with extraordinary powers of observation, or has made his statements without observation and on the most favorable basis of his own expectations. While there is plenty of room and use for the oleates, the worst that can be done by their friends or advocates is to claim for them what they do not nor cannot possess. The principal advantage of the oleates is their solubility in the fatty vehicles by which they are enabled to penetrate, not through the skin and the walls of the vessels, as might be inferred from the writings of

some authors, but into the natural openings of the skin, the glands and follicles; there they may, by osmosis, be interchanged with some of the systemic fluids and be absorbed to a certain extent, but physiological experiments seem to make even this unlikely. The only instance in which this might be the case is with the mercurous oleate, which is so loosely attached to its fatty radical as to easily give it up in exchange for other acids, forming salts with them, which are more readily absorbed and assimilated, producing then the characteristic effects and symptoms of the drug. Mercuric oleate, on the contrary, while easily, by its own constitution, decomposes into mercurous oleate, will not in itself so readily exchange its acid radical for another of the sudorific excretion. That oxide of zinc is

not carried into the follicle is quite as well understood as that white or red precipitate should or could not do so. Take the ointment of either of these precipitates and melt it, and then place it on filtering paper, and you will readily see the unguent base permeating the porous tissue, while the suspended substance is retained on its folds. Dissolve an oleate in any of the fatty vehicles, and you will find that it passes through the porous substance undecomposed and in its entirety, and is thus able to act on the follicle and gland, both by its action on the near-lying cutis, as well as by the possibility of an osmotic process. In this, and in this alone, consists the advantage of the oleates, and a material advantage it is. Thus, while the ointments of white and red precipitate will destroy the conidia and mycel-

lium of superficial fungi in trichophytosis, chromophytosis, etc., the mercury and copper oleates alone can dip into the follicles, and there exert a like destructive action. It might be said that if their principal value consisted in their solubility that as much could be accomplished by watery solutions applied to the surface; but such is not the case. Water or aqueous solutions have a tendency to swell up the epiderm, and by doing so completely occlude the orifices of glands and follicles, while fats or oils, and fatty acids, as well as their derivatives, exert the opposite effect, and are, for that reason, enabled to enter into those structures.

IV.

THERAPEUTIC EFFECT OF THE OLEATES.

BEFORE entering in detail on the medicinal action of the individual oleates, I would dwell on the proper method of preparing them for use. There has been some misconception as to their nature, from the fact that one or two of them can be used to great advantage in their pulverulent state, owing to their mechanical action, besides the chemical influence they exercise, not on the unbroken surface, but on denuded and pathologically affected skin. Thus we find that the zinc oleate, in its powdered state, is a very excellent agent on account of its property to relieve friction, and, at the same time, contracting the congested and tumefied integument.

Again, we see in the application of the powdered silver oleate, to denuded and ulcerating surfaces, a most useful measure to coagulate the albumen locally, and forming a protective covering over these surfaces. In an attempt, however, to extend the use of powders to the other oleates, we simply lose sight of the one great advantage that is of such importance with this class of preparations—their solubility in vehicles that can penetrate into the depression of the epidermic covering. That some of the oleates occur in powder form, and some as plasters, and others as ointments, is part of their physical condition, which the chemist, by admixtures, should not try to pervert. Their principal use must always be as ointments, and it is, therefore, that I would speak here of them and their proper preparations.

While I omit now the proportions to be used—to which I will refer under their respective headings—I can say, that, as a general rule, the ointments should be made by melting the oleates with the fatty substance intended for their bases at as low a temperature as possible to effect solution, which is, as a rule, best accomplished by a water bath, in which the vehicle is first melted, and then the oleate introduced and stirred therewith until completely dissolved. This is done without much trouble and difficulty by any one, either physician or chemist, and holds good for all save the ointment of the silver oleate, and for its preparation more specific directions will be given hereafter. The fatty vehicles intended for ointment bases are a matter of choice, according to the indications of the case. While no doubt

the most elegant preparations can be made with the petroleum fats as bases, they form; in my opinion, and in that of others, the least desirable substances for such use.* I stated in my paper read before the Medical Society of the State of Pennsylvania (*loc. cit.*), that I considered the petroleum products as objectionable for such a purpose, and recently Dr. Robson, of England, has made a similar observation in the use of vaseline as a surgical dressing. I also consider them to possess a feebler power, if any at all, to penetrate than animal fats, which have more affinity for the integument. They always contain some stimulant constituent left after their manufacture, which prevents them from having

* See an article on the "Irritation of the Skin following the Application of Vaseline," in the *London Lancet* of November 8, 1884.

an emollient action; a great source of hindrance to their use as external remedies if you desire to soothe and allay active inflammation. Irritant ointments of veratrine and other like substances, which I had made respectively of paraffinates and simple ointments, proved, in the former, almost inert, while the activity of that made with simple ointment very soon became evident. Dr. J. G. Kiernan, of Chicago, who repeated my experiments with the petroleum products (as have also several others), both upon himself and the lower animals, arrived at the same conclusion. I am also confirmed in my opinion by Dr. Herman Hager, who, in his celebrated work on *Pharmaceutical Practice*, states that the use of vaseline (or cosmoline, or whatever their pseudonyms may be) in place of lard, or an ointment in

such mixtures which contain a remedial agent intended for absorption by the skin, should be discouraged, as vaseline (cosmoline, etc.) prevents absorption.

Although this has been disputed by some, who, however, constitute no medical authority, having a commercial interest only in the sale of their goods, and for pharmaceutical reasons lay more stress on their handsome appearance than on their utility, I think this matter should rest with the physician to decide rather than to the biased vendor.

All of the oleates, if desired in a very concentrated form, can be rendered thin and pliable by the addition of a small quantity of oleic acid, which, if warmed and melted with them, readily renders their consistence fit for the purpose of inunction. As a

diluent, when either the oleate itself or its oleic dilution would make them too powerful, I know of nothing better than good fresh lard or lard ointments; under no circumstances, however, should ointments of the oleates be prepared by simply rubbing them up with the diluent, nor should any of them be accepted by the physician which are not perfectly homogeneous.

The advantages of these ointments may be set forth as being economical, as they need only be used in small quantities, and if properly applied and well rubbed into the dry skin, there will be very little adherent to the surface that can be rubbed off or soil the clothing—a very desirable property. If, however, they are used, as was evidently done by some, who raised objections to them on that point, by daubing them on in large quantities,

on the principle that if a little does well more will do better, they may fail to accomplish the purposes they are intended for, and will simply exert their influence on the patient's clothing alone. They evidently forget the anatomy of the integument, and imagine the minute glands and follicles to possess the capacity of much larger organs. Where for reasons of contact and surface action the ointment has to be applied copiously, as in the instance of the iron oleate ointment to arsenical ulcers, the ointment has to be secured by protective measures, both to prevent soiling the clothing as well as to insure its continued action on the parts affected.

To proceed to the consideration of the individual oleates, their remedial action and indication for use, I will take up first the—

ACONITINE OLEATE.

Aconitine oleate has been lauded for its rapid constitutional effect, which the writer has failed to observe even after a number of careful experiments pursued for years. It has a slight local action, but the effect is however very feeble; it can be used in mild cases of neuralgia owing to its weak anæsthetic impression.

ATROPINE OLEATE.

Atropine oleate has a mild action upon the integument, the toxic effect of the drug being almost impossible, except it be applied freely over a large surface.

ALUMINIUM OLEATE.

Aluminium oleate, melted with an equal proportion of lard and some fatty substance, represents the ointment of aluminium oleate.

The aluminium oleate ointment coagulates the albumen of the parts to which it is applied, constricts the vessels, checks and corrects all secretion, and has marked styptic as well as antiseptic action. It has a decided astringent effect, and is very serviceable in checking mucopurulent discharges that occur in dermatitis and in eczema. It can be applied with advantage over the flexor surfaces, and upon those parts that have an excessive discharge from friction or apposition of two portions of integument. It is also well adapted to cases in which the axilla, groin, and buttocks of infants and children become involved; its application often rapidly checking the profuse secretion, and restoring the integument to a normal condition. In hyperidrosis it lessens and fre-

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quently removes the excessive secretion, while in bromidrosis the fetid discharge will either be entirely overcome by its use, or very much diminished in its activity. It is both beneficial and useful employed as a dressing to foul ulcers, abscesses, sinuses, chilblains, and burns.

ARSENICUM OLEATE.

Arsenicum oleate, melted in the proportion of one part to nine parts of lard as an unguent base, or one part in four, according to the strength desired, forms the ointment of arsenic oleate.

It is both a valuable alterative and escharotic, but should always be used with caution. Applied to the skin in the natural state, little or no change is produced, but when used moderately strong on abrasions, wounds, and

ulcerating and granulating surfaces, it acts as an escharotic, exciting active inflammation and destroying the tissue to some depth. On the other hand, it will have a most excellent alterative impression on the integument in the form of a very weak ointment. In ulcerating epithelioma it is one of the very best remedies, by reason of its being better borne for a longer period in its application than any other form of arsenic. In lupus it is especially serviceable, destroying, by its constant use, cell infiltration in a comparatively mild and painless manner. In the erythematous and tubercular forms of lupus, the parts, however, should be thoroughly scraped, in order to bring the oleate in contact with the abraded surface. In old ulcers, especially those of a scrofulous nature, the arsenic oleate oint-

ment is of great utility. It is, likewise, of value as an alterative, in the form of a weak ointment, either alone or combined with other remedies, in chronic sycosis, seborrhœa, and in some of the chronic varieties of eczema. It can be employed, after scraping or puncturing the surface, to destroy warts, corns, horns, condylomata, old granulations, and nævi. It can also be combined with such preparations as opium, belladonna, hyoscyamus, arnica, arrowroot, naphthol, etc., either to lessen its activity or enhance its effect by the additional impression of one or more of these remedies.

BISMUTH OLEATE.

The ointment of bismuth oleate, a pearl-gray, soft, bland substance, possesses an emollient and slightly astringent action, and is useful in soothing and relieving cutaneous irritation. It

is a valuable remedy in all pustular eruptions, lightly pencilled over the surface. In sycosis it relieves the engorgement of the parts, often aborts the pustules, and will lessen or remove the distressing itching and pricking that is so wearing to the patient. It allays and often overcomes the high inflammation in erysipelas and sunburn. In acne and rosacea it soothes the hyperæmic skin, relieves the engorgement of the glands, frequently subduing some of the most intractable cases, and consequently giving ease and comfort where prolonged suffering formerly existed. In some of the more obstinate forms of acne and rosacea, however, I always deplete the parts thoroughly, first by puncturing them with a needle knife, and afterwards pencilling the surface with the ointment.

This oleate is not only an important, but also a useful remedy in the treatment of the different varieties of acute eczema, soothing and arresting rapidly the irritated integument. It is generally an effective agent for cracked and sore nipples, used either alone or in combination with opium and belladonna and arnica, the dry and excoriated condition of the parts yielding on its application.

CADMIUM OLEATE.

The ointment of cadmium oleate has had as yet but little practical use. It is a very strong stimulant, having an almost caustic action upon the denuded integument, resembling in this respect very much the action of the ointment of nickel oleate. It has been used with some advantage in enlarged glands, especially in scrofu-

lous subjects, stimulating to renewed activity the dormant absorbents, and thus removing the abnormal condition from the tissue. It has also been serviceable at times in cases of chronic eczema with great infiltration, exuberant granulations and old ulcers.

COCAINE OLEATE.

Cocaine oleate* (6 per cent. alkaloid) has a slight anæsthetic action upon the integument. The decided effect, however, that has been claimed by some on its application to the skin has not been observed in my experience, even after repeated experiments with it in operations on warts, corns, horns, cancer, lupus, and the removal of superfluous hairs. Squibb† states, in a recent article, that

* Prepared by W. T. Baker & Co., Philadelphia, Pa.

† *An Ephemeris of Materia Medica*, etc., January, 1885.

when applied to the skin it should be somewhat effective. On the contrary, I have found, by clinical experience, that its action is so weak as to make it of little practical value. Again, the present price is so great—about two dollars a drachm—as to limit its use in general practice, and when employed it is even then too costly an application, except on small portions of the skin. It has been recommended in mild cases of neuralgia, local spots of eczema, and in painful ulcers. Keys* reports that he has relieved with it, temporarily, mild anal pruritus. Jackson† also relates that by its application the pain under the operation for the removal of superfluous hairs is somewhat lessened.

* Journal of Cutaneous and Venereal Diseases, January, 1885.

† *Loc. cit.*

COPPER OLEATE.

Copper oleate, melted with either four or nine parts of fat or lard, gives respectively a twenty or ten per cent. of the ointment of copper oleate. Applied in this form to the unbroken skin it has no visible effect on the surface, but penetrates deeply into the follicles, causing slight stimulation. If brought in contact with the broken skin it has both an astringent and stimulating effect, and an insoluble albuminate is formed which coats over the surface, thus supplying the place of the abraded skin. It condenses the tissues, constricts the bloodvessels, and thus lessens the determination of blood to the part. It acts as an irritant to any delicate surface, causing inflammation and pain. It is a most effective application to

arrest bleeding, particularly in irritable sores and indolent ulcers; obstinate granulations will often yield to the ointment of the copper oleate after resisting the usual applications. It is a most excellent antiseptic, as well as an antiparasitic agent. The most successful results, however, have followed its use upon vegetable parasitic affections, both in my own experience, and in that of Sawyer and Startin,* of England. The last-named observer has recently writtent† as follows concerning the copper oleate: "I have been using the drug for two years, and am so satisfied with its results that I recommended it to my colleagues, who also expressed their satis-

* See an interesting paper on "Oleate of Copper in Ringworm," by James Startin, Surgeon, of England, read before the Willian Society, December, 1884.

† *Brit. Med. Jour.*, Jan. 10, 1885.

faction on trying it. An impure oleate will irritate the skin, but the oleate now made by a process of double decomposition is perfectly pure and in my opinion a very reliable application in ringworm. I have never had complaints, either by hospital or private patients, from its use, and I have used it to some hundreds." In America, Fricke, Blackwood, Snowden, O'Hara, Fenton, McClellan, Prall, Herr, Weir, Rosenthal, Means, and many others have also reported very effective results from its use in their practice. My attention was directed to the curative action of the ointment of copper oleate in parasitic affections, by the remarks of some of my patients; and I believe I was the first to recommend it for its antiparasitic effects in a paper read before the Pennsylvania State Medical Society, already re-

ferred to, and from which I quote:—
“For several years I have had patients tell me, at the hospital and in my private practice, that they cured this or that member of their family of ringworm by putting an old copper penny in vinegar and applying the liquid to the patches. Some, however, resisted the treatment, and members of the latter class were brought to me with the statement that other children had been cured by putting a copper penny in vinegar and applying the infusion, how was it that it did not in this particular case do any good? After due thought it occurred to me that this coppery liquid might destroy the fungus on the surface, but if the parasite after a time passed into the follicles at its lowest depth and invaded the hair bulbs, it could not affect it in any way; and, also, if the

copper solution had the power to kill the parasite on the surface, why could it not do the same within the follicles, providing it could be carried there? Acting upon this idea, and remembering the great penetrating action of oleic acid, I had it combined with copper and mixed with a fatty base. The ointment thus prepared I applied to an inveterate and extensive case of ringworm on the scalp of a child that had been treated with numerous remedies without benefit, and in the period of six weeks the patient was completely cured. Other cases, both of ringworm on the scalp and body, were afterwards treated likewise with equally good results."

In *tinea versicolor*, or *chromophytosis*, it acts in a most decided manner, rapidly removing the parasite from the surface, as also the one which

penetrates deep into the follicles. The red, yellowish, and often dark-brown desquamating spots will clear up, generally quicker and better from the applications of the ointment of copper oleate than by the use of any other remedy. It is equally effective in favus, which yields quickly to its application. In all vegetable parasitic affections to which it is applied, care should be taken to avoid the too frequent use of water to the parts, which may prevent the copper oleate from penetrating to the lowest depth of the follicle, and thus interfere with its action on the fungus. In fact, I always, at the present time, continue the application of the oleate alone, until all evidence of the fungus has disappeared, interdicting water entirely during the treatment, which, I believe, assists in nourishing the

parasite, thus making it more active. In case it becomes necessary to clean the parts, the use of oleic acid, alcohol, or ether will fully accomplish the purpose.

In using the ointment of copper oleate in parasitic affections it is not required to epilate or pluck out the diseased hairs, as the deep and effective action of the remedy will alone complete a cure, without following the old routine plan, which I have for some time abandoned as painful and unnecessary. Copper oleate, melted and spread as plaster, will relieve, and very often cure, hard and horny warts, corns, bunions, and thickened conditions of the epidermis to which it is applied. The ointment of copper oleate is a useful remedy for freckles, and other yellowish-brown or blackish patches of the skin. The ob-

jection to its use by a physician, in a communication to the Journal of Cutaneous and Venereal Diseases, and my reply to it I append:—

[From the Journal of Cutaneous and Venereal Diseases, September, 1883.]

ATLANTA, GA., July 19, 1883.

Editors Journal of Cutaneous and Venereal Diseases :

GENTLEMEN :—I had occasion to use the remedy recommended by Shoemaker, of Philadelphia, for the removal of freckles, quoted in your April number, upon two patients, and each time, about a week after the beginning of treatment, was rewarded by a beautiful crop of furunculosis, but the freckles were not at all influenced by its use. The remedy was prepared agreeably to the formula by him laid down, but the above have been my results. Have you had any such experience?

Yours,

E. BORCHEIM.

[From the Journal of Cutaneous and Venereal Diseases, November, 1883.]

To the Editors of the Journal of Cutaneous and Venereal Diseases:

GENTLEMEN :—In reply to the recent letter of Dr. Borscheim, I would state that the oleate of copper ointment, like all other remedies, is not infallible, and, while in many cases it has served me well in removing freckles, in some it has failed. As I have found the oleate of copper ointment not always certain in its action on freckles, I have never laid great stress upon it as a remedy for removing them, omitting this effect entirely in writing my paper on the oleates in skin diseases, and only suggested it in an incidental manner in reply to a query made as to a remedy for freckles, by a reader of The Medical Bulletin. The unfortunate results that followed the use of the oleate of copper ointment in Dr. Borscheim's practice may have been due either to a predisposition in those persons to furuncles, in which event almost any stimulating ap-

plication would have brought about the same result; or the oleate of copper, as I will show further on, may not have been properly prepared. I am inclined to the latter view, as no furuncles either in my own, or in the hands of others who have largely used the ointment of the oleate of copper, have ever followed. To ascertain this I addressed a brief note to a number of physicians, who, to my knowledge, had used it in their practice, asking them for their results with the oleate of copper ointment, and of any untoward effects or furuncular eruptions following its use. I give a few of the replies, received in brief, as follows, withholding a number to the same effect, not one confirming Dr. Borscheim's experience.*

*Dr. Shoemaker incloses copies of letters from Drs. O'Hara, Blackwood, Snowden, Fricke, Fenton, McClellan, Prall, Herr, Weir, and Rosenthal. These letters are to the effect that the writers have used the oleate of copper ointment with benefit in freckles and other affections, and without the production of furuncles or any other untoward effects.—EDITOR.

To show in which way the oleate of copper, as well as all the oleates, may be rendered not alone unserviceable, but absolutely injurious, I would say, that when I stated in my article on the oleates that they should be made by the decomposition of sodium oleate with a solution of the salt of the desired base, I understood, of course, that the sodium oleate should be made of a good oleic acid. The United States Pharmacopœia, in its last edition, has adopted oleic acid amongst its official articles, and the description of it applies to an oleic acid which can safely be used for making the oleates such as I proposed. The oleic acid generally in the market, and on account of its low price kept by most druggists, and offered by some of our manufacturing chemists, more or less purified, is nothing more than the red oil of the candle-makers, a very impure oleic acid, containing admixtures and contaminations which can only be removed by a tedious process, more so and at greater expense than the direct pro-

cess of making a good and sufficiently pure oleic acid, answering the test of the United States Pharmacopœia, from the oil of sweet almonds. The oleic acid obtained as a by product in the candle manufacture, contains considerable stearic acid, its least objectionable admixture, but one which renders oleates made from it less diffusible. It contains, besides, in consequence of being overheated in the process of its manufacture, various volatile acids, hydrocarbons, sebacic acid, and, above all, oxyoleic acid, which is well known by giving fats their rancid odor and character when formed therein. Pure oleic acid even absorbs some oxygen from the atmosphere under ordinary circumstances, forming oxyoleic acid, but when heated does so in a very large degree. The red oil, or oleic acid of commerce, in being separated from its glycerine base, is exposed to a high heat, and is thus changed largely into oxyoleic acid, with all its characteristic irritant properties and odor.

The most of the oleates which have been shown to me by manufacturers who were desirous of making them according to the formula given in my paper, had, by appearance and odor, evidently been made with the common oleic acid, and were, besides, not even properly decomposed or purified, and thus well calculated to do more harm than good, and prove, probably, irritative and productive of eruptions and furuncles. The oleates and the ointments thereof used by me, and by most, if not all, the physicians who kindly gave me their notes, were from the laboratory of Dr. L. Wolff, of this city, the chemist to whom we are indebted for the development of this class of oleates. They are by him obtained either by the decomposition of sodium oleopalmitate, freshly prepared from pure oil of sweet almonds, as oleopalmitates, or pure oleates from sodium oleate, made of pure oleic acid, derived from fresh oil of sweet almonds and freed from palmitic acid. Such an oleic acid answers the de-

scription given of it in the United States Pharmacopœia, and should be the only kind used. We feel sure that no unpleasant effects will occur with such oleates if properly and judiciously used. That the price of the oleates is slightly advanced by making them of pure material, is of no importance when we consider the small quantity that is necessary in the treatment of skin and other affections.

Respectfully,

JOHN V. SHOEMAKER, M.D.,
Philada.

IRON OLEATE.

Iron oleate is readily soluble in fats. Experiments with this oleate, mixed with the various fats and given internally, have not brought about any good results. The use of the ointment of iron oleate by the inunction method has no apparent constitutional effect, for the reasons that have

already been cited under their physiological action. It was thought by the writer, after some clinical experiments, which were presented in a former paper, and in which the inunction of iron oleate appeared to be of systemic value in anæmic and scrofulous cases, that it would be an invaluable remedy for those diseases, but subsequent and more extended experience has shown its action on the system to be of no value. The action of iron oleate, like all the other metals and alkaloids of the oleates, is mainly upon the parts to which it is applied. The ointment of iron oleate is a valuable styptic and astringent. In the inflammatory form of eczema, in which the surface has become denuded, red, raw, and bleeding, the application of a weak ointment of iron oleate, or the oleate itself used

in other soothing and slightly astringent combinations for the same affection will prove of the greatest value, its styptic and astringent action having the most happy effect upon the parts. It has a marked effect used in pustular eczema, sycosis, furuncles, and in scrofulous ulcers and sinuses. The iron oleate, mixed with oil of ergot or any of the ordinary oils, can be used with advantage in dry seborrhœa, and in certain forms of alopecia that result from an irritable condition of the glands of the parts. The first and second stages of acne rosacea are vastly benefited and often entirely relieved by the application of a weak ointment of iron oleate. The lesions that result from arsenical poisoning, especially the pustules and ulcers, are more amenable to the action of this oint-

ment than any other remedy that I have used in such conditions. A number of cases of arsenical poisoning have come under my observation, particularly in workingmen in several large chemical establishments, and in all cases the pustules and deep and angry ulcers that were present, and upon which other remedies had failed, rapidly yielded to its application.

LEAD OLEATE.

Lead oleate, melted with equal parts of lard or lard-oil, or a mixture of the two according to the season, to present it in ointment form, gives a cream-colored, semi-solid ointment of the consistence of simple cerate. It is more easily and cheaply prepared than either Goulard's cerate, or Hebra's litharge ointment, or any of

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the later modifications, and is also more readily absorbed, and is superior to all of them.

Unna, and many other physicians who have tested the action of the ointment of lead oleate, report excellent results from its use.

The ointment of lead oleate, when applied to the denuded skin, has both an astringent and sedative action, arresting by this effect morbid discharges and allaying irritation. It soothes effectually the intense irritation that is often present in papular eczema, and in those forms of the same disease that appear in the flexures of the joints, around the axillæ, the inner part of the thighs and perineum. Pustular eczema of young infants, which is so annoying to the little sufferers, is often benefited, and the inflammation, discharge, and

itching entirely checked by its free application; it is equally beneficial in fissured eczema of the palmar and plantar surfaces. If the inflammation and cracking, however, be severe and deep, and require a certain amount of stimulation, the addition of naphthol, oil of chamomile, or oil of cade, will increase very much its curative action. This ointment is a useful remedy in hard and indurated papules, in acne of the face, neck, and back, and in rosacea. Thymol, carbolic acid, naphthol, and many other stimulating or soothing agents can sometimes with advantage be combined with it.

MERCURIC OLEATE.

The ointment of mercuric oleate is a yellowish chemical combination having a fatty smell, and is of an

unctuous consistence. It has a stimulating, resolvent, and alterative impression used on the integument, especially upon tumors, glandular enlargements, indurations, and thickening of the skin. In some of the old cases of eczema, in which the skin becomes greatly infiltrated, the twofold action of the ointment of mercuric oleate is often attended with happy effects. It is an acceptable, and, at the same time, beneficial agent in obstinate ulcers and indolent papules, tubercles, and in infiltration that often is attendant upon or follows abscesses, in inflammation of the hair follicles of the beard, and scrofuloderma. It can be used with success in the excess and deficiency of pigment, that occur either as a disease, from applications, or from an effect of disease. It is a

useful remedy in both the animal and vegetable parasitic affections. In animal parasitic disease, especially in phtheiriasis, or lousiness, the ointment of mercuric oleate has alike the effect of destroying both the parasite and nits, which are not always reached by other mercurial preparations. In all varieties of vegetable parasites, it is not only effective on the surface, but possesses the power of penetrating into the hairs, the follicles, and sebaceous glands, and thus killing the fungus that has pushed into these parts.

The advantages of the ointment of mercuric oleate over the old mercurial ointments for its topical use are—

First. Its chemical combination, which makes it easier absorbed, gives greater penetrating action, and thus

manifests itself in more prompt remedial effect.

Secondly. It possesses the advantage of being free from rancidity, so objectionable a feature in the ointments of other mercurial combinations.

Thirdly. It is both economical and clean.

In concluding the description of the ointment of mercuric oleate, I wish to call attention to the fact, that while it is more rapidly absorbed, yet it is slow, for the reasons already mentioned, under its physiological action, to give rise to systemic effect. Large quantities can be applied over the general surface, either in children or adults, with great impunity, its toxic or constitutional effect seldom following in the majority of cases in which it is used.

MERCUROUS OLEATE.

The ointment of mercurous oleate is very much stronger in mercury than that of mercuric oleate. In the ratio of 41.6 to 26.2, or about one and a half times as strong, it has marked stimulating action bordering on congestion on the integument, and has a decided resolvent and alterative effect. It is therefore applicable to the same class of affections in which the ointment of mercuric oleate is used, particularly if it is desirable to make a more decided impression.

Having had repeated failures with the ointment of mercuric oleate in the inunction treatment of syphilis, I requested Dr. L. Wolff to make me a stronger preparation, and the result was the development of the ointment of mercurous oleate.

In the inunction treatment of syphilis this oleate is far superior to either the ordinary blue ointment or the mercuric oleate. It is a very powerful agent, and should be applied cautiously, as it possesses deep penetrating power, and its quick diffusion will often bring about rapid constitutional effects. Its advantages over the ordinary blue ointment are its cheapness and the cleanly manner of its application. A piece about the size of a bean can be gently rubbed in the axillæ, as well as the same quantity on each limb or on each side of the trunk. It will be quickly absorbed, may leave a reddened surface, but will neither stain nor discolor the linen, nor occasion the annoyance that follows the old inunction treatment of syphilis. An eczematous condition that is

often feared, and that has been referred to as an objection in the inunction treatment of syphilis by Dr. John Ashhurst, in his paper on the "Treatment of Syphilis," presented to the Philadelphia County Medical Society, can always be avoided by having the patient use vapor and hot-air baths every second or third day; and I regard the constant use of these baths now as essential to success. I say further that, after some years' experience, the constant application of the ointment of mercurous oleate for a short length of time, or any fatty substance to the skin, will attract dust and dirt to the parts, the glands and follicles will become distended, both with the substance applied and the foreign material, and the parts must be opened up very often by baths, otherwise any form of mercury

combination suspended in a fatty vehicle would naturally fail to pass in, and would consequently set up an inflammation on the surface.

The ointment of mercurous oleate is a most effective application in old spots of psoriasis, and in chronic palmar and plantar eczema in which the integument becomes thickened, harsh, dry, and cracked. In these lesions the oleate can be used alone, or it can be advantageously combined with some form of tar or naphthol.

MORPHINE OLEATE.

Morphine oleate has, like all the alkaloidal oleates, a feeble action, and only upon the part to which it is applied. It can be employed in all irritable conditions of the integument, but many other stronger sedatives are preferable.

NICKEL OLEATE.

Nickel oleate mixed with a fatty base, in the proportion of from one to sixty grains to the ounce, has a very decided astringent action, almost bordering upon the effect of a caustic on abraded surfaces. The ointment of nickel oleate of a weak strength, from five to twenty grains to the ounce of lard, acts at times very well in epithelial ulcerations. It is often effective in exuberant granulations and in old callous ulcers. In some chronic cases of eczema, especially of the extremities, in which the skin is deeply infiltrated, hard, and of a leathery state, if it be applied in the proportions named, it will generally be attended with good results.

QUININE OLEATE.

Quinine oleate, both from physio-

logical experiments, which have heretofore been given, and from repeated clinical experience, has proved with me of little if of any service. Several cases have been reported in the medical journals in which its use has been extolled as an invaluable remedy in cases of intermittent fever, in debility, and in fact wherever quinine is indicated and is not well borne by the alimentary canal. In my service in the Philadelphia Hospital for Skin Diseases, and in private practice, I have used large quantities of quinine oleate from all the prominent manufacturers, and have as yet to observe a single case that has had any decided constitutional effect from its topical application. I have repeatedly employed it freely in intermittent fever, both in children and

adults, but without effect, the paroxysms returning unless arrested by some other means.

SILVER OLEATE.

Silver oleate, applied in its natural form to the abraded skin or sores, combines with the albumen and fibrin of the parts, forming a coat and thus excluding the air. It likewise causes a powerful contraction of the bloodvessels, and condenses and superficially destroys the tissue. Silver oleate sprinkled over ulcers, bed sores, and exuberant granulations will set up a healthier action of the surface. When previously dissolved with an equal amount of oleic acid and then mixed with lard in the proportion of from five to sixty grains to the ounce, it forms a dark-brown, soft, and pliable ointment. The ointment of this

oleate is a safe and efficacious remedy applied over the inflamed surface of erysipelas, or around the margins to prevent the inflammation from spreading. In superficial lupus, if kept constantly applied to the parts, it lessens the cell infiltration, and thus reduces the active inflammation. In boils and carbuncles it is serviceable, and often arrests pustulation in its early stage. Eczema, that occurs around the mucous outlets, especially the anus and genitalia, attended with an intolerable itching, will frequently be quickly relieved by applying the ointment of silver oleate either alone or combined with opium, belladonna, or hyoscyamus. Its deep penetration, stability, and prompt action, together with its comparative painless and mild effect are the advantages it possesses over the ordinary silver ointments.

STRYCHNINE OLEATE.

Strychnine oleate can be applied to the integument in large quantities and for some time, without producing any systemic action of the drug. Its local impression is weak, and it is a remedy of but little use or value.

TIN OLEATE.

Tin oleate, mixed with lard or a fatty base, in the proportion of from ten to sixty grains of the former to one ounce of the latter, forms a grayish-brown ointment, possessing an astringent and nutritive action. It is of value and service in papular and fissured eczema. The ointment of tin oleate is of the greatest utility in diseases of the nails, or that are abnormal or deficient in growth. It assists in such

cases in overcoming the brittle, split, and soft conditions that result from injury to the parts, or that follow certain affections of the skin. The ointment of tin oleate, especially when combined with a little carmine, forms an elegant article of toilet for the nails and surrounding parts, giving them a beautiful lustre. Ag-nail, or the ragged and attenuated skin of the base of the nail, that is so frequently observed from neglecting these appendages, can be relieved or checked by the astringent action of this ointment.

VERATRINE OLEATE.

Veratrine oleate has a valuable action as a counter-irritant when used upon the integument.

ZINC OLEATE.

Zinc oleate occurs as a fine, pearl-colored powder, with a soft, soapy feel, very much like powdered French chalk. It has both an astringent and stimulating action. In hyperidrosis and osmidrosis, or excessive sweating, fetid or otherwise, it is one of the very best remedies for topical use. It is especially applicable to those who suffer from an increased flow of sweat around the axillæ, genitalia, and palmar and plantar surfaces. It is to the latter unfortunate and distressing class of cases, in which the epidermis often macerates, leaving a tender and exposed skin, attended with a disagreeable odor, that it can be used for relief and at times with permanent good results. Dr. William Murrell, in the

London Medical Record, of November 15, 1883, also calls attention to the value of the zinc oleate in local sweating. He reports that the zinc oleate mixed with thymol (1 in 500) and used as a dusting powder, forms an excellent application in many varieties of local sweating. He also states that he has used it with much success in the night-sweating of phthisis.

In acute vesicular eczema, in which the parts become covered with small vesicles, swollen, hot, inflamed, or raw, weeping, and attended with intense itching, the combined protecting, astringent, and stimulating action of the zinc oleate will usually cause all the inflammatory symptoms to abate, the discharge to dry up, and the swollen skin to resume its normal condition. Dr. McCall Anderson has referred to its utility in eczema, es-

pecially of the nares, in an article published in the Journal of Cutaneous and Venereal Diseases. The great advantage and value of the zinc oleate among the same class of cutaneous affections, has been referred to by Dr. James Sawyer in a communication to the British Medical Journal, of February 10, 1883, and also in another to the Birmingham Medical Review, published a year later.

Dr. Sawyer, in speaking of this and other oleates used in the same form, adds that "they can be employed in those troublesome, acute, and discharging affections of the skin in which greasy preparations of any kind cannot be borne." Zinc oleate will cling to the skin, and will not fall or brush off like ordinary dusting powder, and is, therefore, of very great value in seborrhoea oleosa. It forms

a most excellent and useful toilet powder for ladies who are troubled with shining faces or seborrhœa oleosa, dusted over the parts either alone or mixed with an equal quantity of arrow-root, bismuth, subnitrate, or lead carbonate, and scented with the oil of verbena or rose. It likewise acts in a most efficacious manner dusted on an inflamed surface that is hot and tumid; in cases of erythema about the groins and axillæ, and is also beneficial in herpes and herpes zoster. One part of the powdered zinc oleate melted with four parts of a fatty vehicle yields the ointment which can be used in the same class of affections just enumerated, and in acne, rosacea, and in sub-acute and chronic forms of eczema.*

* See report on "Oleate of Zinc in Eczema," by Dr. A. A. Wells, Boston, Mass., in the New England Medical Monthly, January, 1885.

I have now described in detail the special effect of each individual oleate, and the deductions that have been drawn from a personal and most careful observation during the past eight years in laboratories with the chemist and physiologist, and from my private practice and extensive clinical service. A large number of practitioners, who have used the oleates in the manner in which they should be employed, have reported highly favorable and practical results from them. Others have been unfortunate enough to apply impure or improperly prepared oleates, and the results in such cases have generally been either negative, or irritating and injurious to the parts. A very few unfortunate, careless, and injudicious observers, skeptics in therapeutics, who only believe in the

older and oft-tried remedies, have taken up the oleates for fashion or popularity's sake, and, after a very limited experience in their application, condemn them without a fair trial. The communications that have appeared from the latter class speak of their action disparagingly, and their effects as problematical, but are devoid of research, which appears when they speak of quinine oleate being limited to inunctions for its systemic impression, showing an absence of practical experience or proper deductions from their results.

In concluding my remarks I would sum up by stating that although the oleates have not been found to fill the place they were originally intended for by those who introduced them, they have made for themselves a most

prominent place amongst the more scientific means we possess for treating affections of the cutaneous covering. They have opened up a new branch for therapeutics, and occupy a position that has not been held either by ointment or lotion, and which they will occupy not in a transitory manner, but permanently, and in an increased ratio as their nature, use, and effect will become more thoroughly understood and known.

In the following papers will also be found much of instructive interest in regard to the oleates:—

“Working Formula for the Oleates,” by Henry B. Parson, in the *Druggists’ Circular and Chemical Gazette*, January, 1885; “Oleates,” by F. C. J. Bird, read at a meeting of the Manchester Pharmacy Students’ Association, December 18, 1884, in the *London Pharmaceutical Journal* and

Transactions, January 3, 1885; "Neutral Oleate of Mercury," by Charles R. C. Tichborne, LL.D., etc., in the London Medical Press, September 24, 1884.

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OLEATES.

THE peculiar power possessed by oleic acid of penetrating the skin and subjacent tissue and of thus bringing medicinal principles with which it may be combined into direct contact with diseased parts, and facilitating thereby the absorption of medicines applied epidermically, has been familiar to the profession for a number of years. It was hoped, when this property was announced, that a desideratum in the treatment of local affections, as localized chronic inflammations, etc., and in securing the constitutional effect of drugs in cases in which an irritability of the primæ viæ forbade their exhibition per os, had been supplied. This hope was disappointed, however, through the failure on the part of the pharmacist to furnish the physician with eligible preparations of the salts of oleic acid with metals or alkaloidal bases. This promising means of medication thus fell into comparative disuse, and epidermic medication was seldom resorted to.

Latterly, however, and principally through the experiments of Dr. J. V. Shoemaker, of Philadelphia, pharmacy has supplied this defect. As a result of his experiments, Dr. Shoemaker has also been enabled to give the medical profession many valuable suggestions touching the therapeutic application of these salts.

We secured from Dr. Shoemaker full instructions in his method, and immediately placed before the profession a line of these preparations. The favor with which they have been received, and the rapidly growing demand for them, are their most emphatic endorsements. The oleates of the following metals and alkaloids are on our list:

Aluminium.—A valuable astringent, serviceable in eczema, and for dressing burns.

Arsenic.—Used in the form of an ointment, containing twenty grains of oleate of arsenic to the ounce. Valuable as a caustic in lupus, epithelioma, etc.

Bismuth.—An excellent emollient application.

Copper.—For the treatment of ringworm, and the removal of freckles, etc.

Iron.—A local astringent and general tonic.

Lead.—A cleanly and efficient substitute for Hebra's Diachylon ointment.

Mercury.—A discutient to inflammatory exudates, and to secure the constitutional effect of the metal.

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